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(54) Decorative and protective coating of floors

(57) Method for the decorating and protective coating of floor surfaces, such as timber or cork surfaces, comprising the application of a blend of powders to the floor surface to provide the colour required, sealing the coloured surface with a thermoplastic acrylic - urethane emulsion, and applying at least one top coat of a urethane resin to the sealed surface. Prior to the application of the powder blend, the floor surface is sanded.

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NOVEL METHOD FOR THE DECORATING AND PROTECTIVE COATING OF FLOOR SURFACES

The present invention relates to a method of decorating cork and timber floors and an improved method of protection thereof.

In the past, cork and timber floors have been protected with a clear lacquer or urethane to allow the texture of the substrate to show through while providing a wearable surface which protected the substrate. This method of floor protection, however, could not accommodate the colouring of the substrate whilst also allowing the texture to be seen.

To colour the substrate, the flooring had to be coated with a paint which, when applied, prevented the underlying texture of the cork or timber substrate being seen, which as a result defeated the purpose of laying a naturally textured substrate.

It has therefore become necessary to provide flooring materials which not only provide the soft natural texture of cork and timber, but are able to aesthetically blend with the pastel colouring of today's modern decor while ensuring a long term protection of the substrate against wear.

The present invention provides a method of decorating cork and timber floors comprising: sanding the floor surface lightly to remove surface anomolies and unwanted surface buildups, colouring the sanded surface by evenly coating the said surface with a blend of powders, said blend of powders being such that the powder penetrates the pores of the said surface during

application, locking the blend of powders within said pores by the application of a sealer to the coloured surface, said sealer being such that the blend of powder is prevented from becoming dislodged from within said pores while providing a chemically suitable surface for the application thereto of at least one top coat, and further applying to the sealed surface of said sealer at least one top coat, wherein the first of said top coats, when applied to the sealed surface, bonds with said sealer to produce a chemically-linked high density transparent finish which allows the texture of the substrate to be visible whilst providing a pastel colouring to the substrate.

In a preferred embodiment of the invention the blend of powders, sealer and top coat are the components of a single system. The system is comprised of

(i) the colour coat - applied to a prepared cork floor;

(ii) the sealer - applied to lock the said colour coat to the floor; and

(iii) the top coat - a thick tough coat of the high build polyurethane which is applied to keep said sealed surface.

This system allows the natural cork to be seen while also having been toned to suit the decor, and provides a colour stable, highly resistant floor covering which also provides protection and hard wearing properties.

The invention also provides a specific blend of powders for colouring the substrate comprised of: 20-80% by weight of a medium ground calcium carbonate or metal oxide, preferably zinc oxide, extender of particle size between 200-450 microns, with

a brightness of 90 plus on Zeiss elrepho reflectometer, mixed together with 20-80% by weight of titanium dioxide pigments and up to 20% by weight of oxide pigment and optionally up to 20% by weight of a chelating agent, the percentage weights being based on the final weight of the powder blend.

Calcium carbonate is the preferred extender for the powder blends used to colour timber substrate, while metal oxides, in particular zinc oxide, are the preferred extenders for the powder blends used to colour cork substrate. The particle size of the extender provides a carrier medium for the colourant to be evenly spread over a varying surface as in timber and cork.

The addition of a chelating agent to the powder blend prevents the effect of decolourization of the floor coating caused by the leaching of substances from the substrate, such as the browning effect experienced with processed cork which results from leaching of tannin. The chelating agent is optionally added to the powder blends for use on either timber or cork surfaces. An example of a suitable chelating agent is ethylene diamine tetraacetic acid (EDTA).

In addition, the invention provides a sealer which locks the powder within the pores of the surface of the substrate and also provides a chemically suitable surface for the application thereto of the top coat. The sealer is comprised of a white water-based emulsion consisting of a mixture of thermoplastic acrylic emulsion together with a urethane emulsion, said mixture having a film-forming temperature of between 10-40^{o}C, a specific gravity of between 0.9 to 1.10, preferably 1.036, and

a pH value of 6.5 to 8.0; together with a solvent borne acrylic resin, an emulsifier, a coalescing solvent, a defoamer, a hydrocarbon solvent and a small amount of a primary amine.

The addition of the urethane emulsion to the thermoplastic acrylic emulsion enhances the bonding of the floor coating to the surface of the substrate. The solvent borne acrylic resin provides the sealer with flexibility as well as promoting the cross-linking between the sealer surface and the top coat applied thereto. The emulsifier enables the acrylic resin to become incorporated in to the said water-based acrylic emulsion. The hydrocarbon solvent is an organic aromatic solvent. It provides stability of the final emulsion and allows drying of the sealer. The primary amine acts as a thickener of the final emulsion and to accelerate the cross-linking between the sealer surface and the top coat applied thereto.

The sealer, in being water-based, reduces the toxicology of a major part of the said system and also provides a fast, practical, ready to use system for a trades person.

The invention further provides a top coat which cross-links with the surface of the sealer and provides a high density, strong wearing, durable surface. The top coat is comprised of urethane resin consisting of 20 - 80 % by weight of a polyisocyanate produced by the polymerization of toluene diisocyanate with trimethylol propane in the presence of a polyether polyol, in admixture with 0.5 - 2.5 % by weight of copolyacrylate and 1 - 2 % by weight of a monofunctional isocyanate having an NCO content of approximately 20%, up to

2% by weight of one or more UV absorbers, and 13.5 - 78.5 % by weight of hydrocarbon solvent blend having a mixed aniline point range 10 - 18°C, wherein the percentage weights are based on the final weight of top coat. The added copolyacrylate acts as a levelling agent. The added monofunctional isocyanate has the characteristic of readily reacting with water and other compounds with reactive hydrogen atoms and offers stability to one part formulations. This top coat therefore offers the desirable features of urethane resin and the added higher solids provide increased 'build' on the floor for protection. UV absorbers which can be used in accordance with the invention can be selected from UV absorbers of the hydroxyphenylbenzotriazole class, such as TINUVIN 292® or TINUVIN 1130®

In a preferred embodiment the urethane resin is prepared by thoroughly mixing together:

- 20 - 80 %, based on final weight, of a polyisocyanate having molecular weight between 2,000 to 50,000 and produced by the polymerization of toluene diisocyanate with trimethylol propane in the presence of a polyether polyol;
- 0.5 - 2.5 % based on final weight, of acrylate copolymerisate;
- 1 - 2 %, based on final weight, of p-toluene-sulfonyl isocyanate;
- 0 - 3 %, based on final weight, of ethyl acetate (Low Hydroxyl Grade);
- 12.5 - 78.5 % by weight of hydrocarbon solvent blend having a mixed aniline point range 10 - 18°C.

In accordance with the invention, the top coat applied to the surface of the sealed substrate can be chosen to provide either a matt, a satin or a gloss finish as desired.

A matt finish can be obtained by applying the required number of coats, preferably two, of a matt finish coat, and lightly sanding in between coats.

A satin coat can be obtained by applying the top coat as described above, followed by sanding and a coating of a matt finish coat, optionally in admixture with the above described top coat to obtain the degree of gloss required.

A high gloss finish is obtained with the application of one or more coatings of the above described top coat.

It is possible to recoat the coloured and sealed substrate, where the top coat has not worn through, in the normal manner. However, where the top coat has worn through it is essential to completely sand back to the surface of the substrate and reapply the colouring, sealer and top coat as herein described. This ensures colour match and an even end result.

The following examples serve to illustrate the present invention and it is not intended that the invention be limited to these examples. Commercially available ingredients are given by their registered trade name. Unless otherwise stated percentage values are percentage weights based on final weight of the composition.

The following are examples of blends of powders suitable for coating timber and cork surfaces.

EXAMPLE 1 : BLUE COATING

COMPONENT	% BY WEIGHT TIMBER	CORK
Clay filler, mesh size 200-600	40	-
Blue Oxide Ultramine	7	7
Glass filler	5	20
Metal Oxide	21	-
EDTA	8	8
Zinc Oxide	19	65

EXAMPLE 2 : GREEN COATING

COMPONENT	% BY WEIGHT TIMBER	CORK
Clay filler, mesh size 200-600	40	-
Green Oxide	7	7
Glass filler	5	-
Metal Oxide	21	21
EDTA	8	8
Zinc Oxide	19	64

EXAMPLE 3 : GREY COATING

COMPONENT	% BY WEIGHT TIMBER	CORK
Clay filler, mesh size 200-600	41	-
Black Oxide	1.30	1.30
Blue Oxide Ultramine	0.70	0.76
Glass filler	5	-
Metal Oxide	21	20
EDTA	8	8
Zinc Oxide	23	69.94

EXAMPLE 4 : PINK COATING

COMPONENT	% BY WEIGHT TIMBER	CORK
Clay filler, mesh size 200-600	42	-
Red Oxide	5	8
Glass filler	5	20
Metal Oxide	21	-
EDTA	8	8
Zinc Oxide	19	64

EXAMPLE 5 : WHITE COATING

COMPONENT	% BY WEIGHT TIMBER	CORK
Clay filler, mesh size 200-600	40	-
Glass filler	5	-
Metal Oxide	28	20
EDTA	8	8
Zinc Oxide	19	72

The following examples illustrate a method of preparation of a sealer in accordance with the invention.

EXAMPLE 6

A	%
Hydrocarbon Solvent, Aniline Point 10°C	15.00
Ester-Alcohol	4.00
Acrylic Polymer Solution	10.00
Dimethylethylamine	0.50

B	%
Water	33.25
Defoamer, containing mineral oil, waxes, hydroxylsilica and dispersant	0.25
Sorbitol monolaurate	1.50
Polyoxyethylene 20, sorbitane monolaurate	0.50
Aqueous acrylic emulsion	35.00

Separately mix together the components of A and B until each is homogenously mixed. Very slowly add A to B with constant stirring. Check viscosity while mixing A to B. When mixing is complete sieve final mixture through fine strainer to remove visible particulate matter.

Final product has a viscosity between 150 to 400 cps and a specific gravity between 0.9 to 1.10.

EXAMPLE 7

A	%
Hydrocarbon Solvent, Aniline Point 10°C	15.00
Ester Alcohol	4.00
Acrylic Polymer Solution	10.00
Dimethylethylamine	0.50

B	%
Water	33.25
Antifoam	0.25
Emulsifying Agent	1.50
Wetting Agent	0.50
Acrylic Emulsion	35.00

The components are mixed in accordance with Example 6. The final product has a viscosity between 150 to 400 cps and specific gravity between 0.9 to 1.10.

EXAMPLE 8

A	%
Hydrocarbon Solvent, Aniline Point 10°C	12.00
Ester Alcohol	4.00
Acrylic Polymer Solution	8.00
Dimethylethylacetate	0.40
Emulsifying Agent	

B	%
Water	25.20
Emulsifying Agent	0.80
Thermoplastic Water-borne Acrylic Polymer	28.00
Water-borne Polyurethane	20.00

The components are mixed in accordance with Example 6. The final product has a viscosity between 150 to 400 cps and specific gravity between 0.9 to 1.10.

The following examples illustrate a method of preparation of a top coating in accordance with the invention.

EXAMPLE 9

Thoroughly mix together

- 95.45% of a polyisocyanate having a molecular weight between 2,000 and 50,000 and produced by the polymerization of toluene diisocyanate with trimethylol propane in the presence of a polyether polyol;
- 0.95% acrylate copolymerisate;

- 1.20% p-toluene-sulfonyl isocyanate;
- 2.40% ethyl acetate (Low Hydroxyl Grade).

Final product has a viscosity between 38 to 40 Ford cup secs and a specific gravity between 0.95 to 1.05.

EXAMPLE 10

The components below are thoroughly mixed together to give a final product having a viscosity and specific gravity as in Example 9.

COMPONENT	%
Urethane-based finish (product of described reaction)	47.725
Screened Unithane®	47.725
Paint levelling additive	0.95
Monofunctional Isocyanate	1.20
Ethyl Acetate (Low Hydroxyl Grade)	2.40

EXAMPLE 11

The components below are thoroughly mixed together to give a final product having a viscosity and specific gravity as in Example 9.

COMPONENT	%
Urethane-based finish (product of described reaction)	47.00
Screened Unithane®	47.00
Paint levelling additive	0.38
Monofunctional Isocyanate	0.94
Ethyl Acetate (Low Hydroxyl Grade)	3.10
Hydroxyphenylbenzotriazole class U.V. absorbers	1.58

The Claims:

1. A method of decorating cork and timber floors comprising the steps of:

- lightly sanding the floor surface,
- colouring the sanded floor surface by evenly coating the said surface with a blend of powders,
- applying a sealer to the coloured surface,
- applying at least one top coat to the sealed surface.

2. A method according to claim 1, wherein the blend of powders is comprised of:

20-80% by weight of a medium ground calcium carbonate or metal oxide, preferably zinc oxide, extender of particle size between 200-450 microns, with a brightness of 90 plus on Zeiss elrepho reflectometer, mixed together with 20-80% by weight of titanium dioxide pigments and up to 20% by weight of oxide pigment and optionally up to 20% by weight of a chelating agent, the percentage weights being based on the final weight of the powder blend.

3. A method according to claim 2, wherein the metal oxide is zinc oxide.

4. A method according to claim 2, wherein the chelating agent is ethylene diamine tetraacetic acid.

5. A method according to any one of claims 1 to 4, wherein the sealer is comprised of:

a white water-based emulsion consisting of a mixture of thermoplastic acrylic emulsion together with a urethane emulsion, said mixture having a film-forming temperature of between 10-40^{o}C, a specific gravity of between 0.9

to 1.10, preferably 1.036, and a pH value of 6.5 to 8.0; together with a solvent borne acrylic resin, an emulsifier, a coalescing solvent, a defoamer, a hydrocarbon solvent and a small amount of a primary amine.

6. A method according to any one of claims 1 to 5, wherein the top coat is comprised of urethane resin consisting of 20 - 80 % by weight of a polyisocyanate produced by the polymerization of toluene diisocyanate with trimethylol propane in the presence of a polyether polyol, in admixture with 0.5 - 2.5 % by weight of copolyacrylate and 1 - 2% by weight of a monofunctional isocyanate having an NCO content of approximately 20%, up to 2% by weight of one or more UV absorbers, and 13.5 - 78.5 % by weight of hydrocarbon solvent blend having a mixed aniline point range 10 - 18°C, wherein the percentage weights are based on the final weight of top coat.

7. A method according to claim 6, wherein the UV absorber is selected from UV absorbers of the hydroxyphenylbenzotriazole class.

8. A method according to claim 6 wherein said urethane resin is prepared by thoroughly mixing together:

- 20 - 80 %, based on final weight, of a polyisocyanate having molecular weight between 2,000 to 50,000 and produced by the polymerization of toluene diisocyanate with trimethylol propane in the presence of a polyether polyol;
- 0.5 - 2.5 %, based on final weight, of acrylate copolymerisate;

- 1 - 2 %, based on final weight, of p-toluene-sulfonyl isocyanate;
- 0 - 3 %, based on final weight, of ethyl acetate (Low Hydroxyl Grade); and
- 12.5 - 78.5 % by weight of hydrocarbon solvent blend having a mixed aniline point range 10 - 18°C.

9. A method according to claim 1, substantially as herein described with reference to any one of the foregoing examples thereof.